

# SITUATION AND LAYOUT SHEET

## DETAILING CHECK LIST

### SHEET CONTENT

Include the following on the Situation & Layout sheet:

- ☐ Plan View
- ☐ Elevation View
- ☐ Typical Section Thru Structure
- ☐ Profile Data for each alignment related to the structure
- ☐ Horizontal Alignment Data
- ☐ Superelevation Data (when applicable)
- ☐ Hydraulic Data (when applicable)
- ☐ Index of Sheets
- ☐ Location Plan
- ☐ General Notes
- ☐ Design Data
- ☐ Quantities
- ☐ Title Block Information

*Note: Sufficient horizontal and vertical alignment information should be given on this sheet to be able to verify all horizontal and vertical geometrical features, such as crossing angle, clearances, cross slopes, etc., without referring to the roadway plans.*

### PLAN

1. Detail alignments as follows:

- ☐ Advance stationing of bridge alignment from left to right. (Generally)
- ☐ Identify survey and profile lines of all alignments.
- ☐ Show bearings of all tangent alignments.

2. At alignment intersections (survey or control lines) show the following:

- ☐ Crossing Stations -- Station and alignment designation of each intersecting alignment.
- ☐ Crossing angles. The crossing angle is defined as the angle measured to the right while looking ahead (station-wise) between the survey or control line of the structure alignment and the survey

or control line of the feature crossed. If one or both of the alignments involve a horizontal curve, use a line tangent to the curve at the point of intersection.

3. Detail abutments and bents as follows:

- ☐ Show and label centerline of all supports with the support designations. If centerline support and centerline bearing coincide, label as centerline bearing of support (ie., CL Brg. Bent #3). Each support is numbered consecutively in the direction of increasing stations regardless of the type of support (ie., Abut. #1, Bent #2, Bent #3, etc.).
- ☐ Show the station and elevation of each support (abutments, bents, etc.) on the structure at the intersection of the profile line and centerline of support.
- ☐ When one or more supports are not parallel to each other or to the alignment of the feature crossed, or the angle between the reference tangent of the structure and the centerline of support differ from the crossing angle, show each different angle once.
- ☐ Show the stations at outside of backwalls.\*

4. Show the following dimensions:

- ☐ The overall structure length -- out-to-out backwalls along survey line.\*
- ☐ The length of each span.
- ☐ The distance between profile lines on dual structures.
- ☐ If the alignment crossed is curved, show the dimensions and slopes between toes of slope.
- ☐ Dimensions and slopes of the feature crossed that are not easily defined in the Elevation View. For example, when the alignment crossed is on a horizontal curve or the structure crosses multiple alignments that are not parallel to each other, show lane and shoulder widths and cross-slopes, median boundaries and slopes, and minimum horizontal clearances between the travelled way and the closest support or other obstruction.

5. Show the following:

- ☐ "Section A-A" arrows in direction of stationing. An alternate method is to label the typical section as "Section Thru Structure" in which case "Section A-A" need not be shown.
- ☐ Traffic flow arrows. Label lane directions.
- ☐ Point of minimum vertical clearance.
- ☐ Deck or approach slab drains, if required.\*
- ☐ Curb, sidewalk and fence, if required.
- ☐ North Arrow.

6. If the project involves a bridge replacement, show the outline of the existing bridge. Give existing Structure No. and call out "to be removed" or "Remove Structure No. \_\_\_\_\_."

7. Title: "**PLAN**"

## ELEVATION

1. For structures that cross multiple alignments that are not parallel to each other such that the typical sections of the features crossed must be detailed in the Plan View, it may be appropriate to show the Elevation View along the Profile or Control Line of the structure. Otherwise, show the Elevation View as normal to the feature crossed.
2. If the Elevation View is shown normal to the feature crossed:
  - ☐ Show centerline to centerline dimensions between abutment bearings and bents. These dimensions should be normal to the feature crossed.
  - ☐ If the feature crossed is a highway, show the typical section of the highway including the following:
    - ✓ Control and/or Profile Lines.
    - ✓ Lane and shoulder widths.
    - ✓ Distance and slope(s) from edge of shoulder to toe of fill or cut.
    - ✓ Cross slopes on roadway: (1) "-2%" if on tangent alignment; (2) "varies" if on superelevation transition; (3) the super-elevation slope for a curved alignment.
    - ✓ Slope banks for Median of feature crossed (if required).
  - ☐ For structures over streams, canals or other waterways, show and call out the following:
    - ✓ Typical section of waterway including channel bottom width, side slopes, riprap thickness and limits above and below flow line, and channel change, as applicable. Indicate that riprap is included in Roadway quantities.
    - ✓ Flow line elevation, indicating whether natural ground or channel change.
    - ✓ Backwater elevation for  $Q_d$ .
    - ✓ Low beam elevation.
  - ☐ For Railroad Structures, show dimensions required by UDOT Standard Drawing 815-8.
3. For structures over a roadway and/or a railroad, locate and detail the point of minimum vertical clearance under the structure in accordance with the following:
  - ☐ Over all roadways: 16'-6" minimum clearance, up to 17'-0" acceptable.
  - ☐ Over railroads: 23'-0" minimum clearance with 6" future ballast.

Additional clearance for settlement should be shown if indicated by the Foundation Report.
4. Show and label the following:
  - ☐ Abutment and Bent Nos. at centerline. Label supports as "Fixed" or "Exp."
  - ☐ The original ground line along the profile or survey line when information is available.
  - ☐ Utilities. Give size, location (vertical and horizontal), type, owner, etc.
  - ☐ 2:1 end slope for structure (or other if applicable.)

- ☐ Concrete slope protection, if required.
  - ☐ 2'-0" minimum clearance between top of concrete slope protection or riprap and bottom of beams.
  - ☐ Abutment and bent footings, and piles or caissons if used.
  - ☐ Parapet and/or fence, if required.
  - ☐ Location of Graffiti Barriers (required on all structures that use steel girders).
5. Detail the girders as simple or continuous spans.
6. If the project is a bridge replacement, show and call out footings, etc. of bents and abutments of existing bridge. Show the limits of removal.
7. Title: "ELEVATION NORMAL TO \_\_\_\_\_" or "ELEVATION" as appropriate. (Substitute alignment name for blank.)

## TYPICAL SECTION THRU STRUCTURE

1. Show a section normal to the structure that includes the superstructure and substructure geometry.
2. Show the following in the superstructure cross-section.
- ☐ Identify control and profile line(s).
  - ☐ Show and dimension the distance between profile lines for dual structures.
  - ☐ Show out-to-out of deck, including parapet and curb or sidewalk if used.
  - ☐ Show and label lane, shoulder and median dimensions. Show and give widths of roadway (distance between parapets), parapets, curb and sidewalk.
  - ☐ Call out structure centerline only if it is required for an adequate interpretation of this view.
  - ☐ Show the deck cross-slope: (1) "-2%" for tangent alignment, (2) "varies" for transition, or (3) the appropriate superelevation slope for a curved alignment.
3. Show the general shape and spacing of the beams.
- ☐ Indicate the beam or structure type:
    - ✓ Prestressed Concrete
      - ◆ Specify AASHTO Prestressed Girder Type (III, IV, V, VI.)
    - ✓ Steel
    - ✓ Post-tensioned
  - ☐ Show the typical beam spacing. If the beam spacing is not constant indicate "varies."
4. Dimension the structure depth (top of deck to bottom of beam at support or point of minimum clearance). If variable, indicate "Varies; 0'-00" at point of minimum clearance.

5. Show the general outline of the bent.
  - ☐ Show the number and type of columns.
  - ☐ Show the typical diameter of the bent columns. (If round)
  - ☐ Show the column footing with piles or caissons as appropriate.
6. Title "**SECTION A-A.**" or "**SECTION THRU STRUCTURE.**"

## PROFILE DATA

1. Show the grade of each alignment leading to and from any vertical curves if applicable. Show straight grade if no vertical curve.
2. Show stations and elevations of
  - ☐ P.C.
  - ☐ P.I.
  - ☐ P.T.
3. Dimension the lengths of any vertical curves.
4. Indicate the location of the structure(s) on the appropriate alignment(s).
5. Title "\_\_\_\_\_ **Profile.**" (Substitute alignment name for blank.)

## HORIZONTAL ALIGNMENT DATA

1. Do not show alignment data for tangent alignments in a separate table but show it in the "Location Plan" and/or "Plan" views by indicating the tangent bearings.
2. List the curve data for all curved alignments that influence the structure. Generally, all the curve data shown on the roadway plans should be listed for both circular and spiral curves when they exist including the bearing of the semi-tangent from either P.C. to P.I. or P.I. to P.T., depending upon the structure location.
3. Identify the curve and/or roadway above each list of data shown as subheadings under the title: "**CURVE DATA.**"

## SUPERELEVATION DATA

1. Show superelevation transition data if applicable. Include superelevation left and right of centerline for each station where there is a change in the superelevation rate.

Example:

<b>I-00 SUPERELEVATION DATA</b>		
Station	± Left	± Right
578 + 30.00	-2.0%	-2.0%
579 + 50.00	-2.0%	0.0%
581 + 10.00	-2.0%	+2.0%
582 + 70.00	-4.0%	+4.0%

## INDEX OF SHEETS

1. Provide for a minimum of 20 sheets on regular jobs. Special jobs may require more.
2. Sheet titles should be listed exactly as they appear in the title block on that particular sheet.
3. Title "**INDEX OF SHEETS.**"

## HYDRAULIC DATA

1. List the hydraulic information as outlined on the Hydraulic Report when required.
2. Title "**HYDRAULIC DATA**"

## LOCATION PLAN

1. Show a small scale plan of the area surrounding the structure. Include sufficient geographical information to ensure an accurate location.
2. Show directional bearing and identify point of intersection of survey lines of features involved.
3. Show and label other structures in the immediate vicinity.

4. Indicate the structure boldly enough to clearly distinguish it from all other structures or features shown.
5. Indicate stationing on both features at least 200 feet in either direction from the structure.
6. Show the structure in same orientation as the main "Plan" View.
7. Show North Arrow.
8. Show rivers, railroads, pole lines, ditches, canals, utilities and any other road or streets, etc., which might affect or relate to the project structure.
9. Call out the names of all features involved.
10. Title "**LOCATION PLAN**"

## GENERAL NOTES

Adhere to the standardized wording of the following notes unless special exceptions apply. (Use only those notes which are applicable.)

☐ For structures using **English Units**:

1. All reinforcing steel shall be epoxy-coated deformed billet steel bars conforming to AASHTO M 284 and AASHTO M 31 Grade 60, respectively.
2. All structural steel shall conform to AASHTO M 270 Grade 36 except where noted otherwise.
3. Exposed concrete corners shall be chamfered 3/4" except where noted otherwise.
4. Cover to reinforcing steel shall be 2" except where noted otherwise.
5. All cast-in-place concrete shall be Class AA(AE) except where specified otherwise.

☐ For structures using **Metric Units**:

1. All reinforcing steel shall be epoxy-coated deformed billet steel bars conforming to AASHTO M 284 and AASHTO M 31M Grade 400, respectively.
2. All structural steel shall conform to AASHTO M 270M Grade 250 except where noted otherwise.
3. Chamfer all exposed concrete corners 20 mm. except where noted otherwise.
4. Provide 50 mm. concrete cover to reinforcing steel except where noted otherwise.
5. All cast-in-place concrete shall be Class AA(AE) except where specified otherwise.
6. All dimensions shown are in millimeters unless specified otherwise. All elevations shown are in meters.

**COMMENTS:**

1. If high strength steel is used, then modify Note 3 to call for AASHTO M 270 Grade 50 or 50W steel and  $f_s = 27,000$  psi. {Weathering Steel is Grade 50W.} [Metric: AASHTO M 270 Grade 345 or 345W;  $f_s = 190$  MPa.]
2. In special locations where the Foundation Report or the Chief Structural Engineer indicate that the subsurface portions of the structure may be exposed to soil or water containing high alkali content or other deleterious substances, add the following note:
  7. All concrete in contact with soil and/or water shall require one additional sack of cement per cubic yard of mix.

**DESIGN DATA**

## 1. Loading

☐ Live Load

- ✓ For structures carrying Interstate, or ramps whose function is to carry traffic on or off the Interstate, use the following wording:
  - ◆ *HS20-44 or Interstate Alternate Loading in accordance with current AASHTO and Interim Specifications.*
- ✓ For structures carrying railroad traffic use the following wording:
  - ◆ *AREA Specifications for Steel Railway Bridges, current edition, Loading: Coopers E-70. (Or appropriate Coopers loading as required by the particular railroad).*

☐ Dead Load Only:

- ✓ For structures carrying no live load such as retaining walls, headwalls, miscellaneous structures off the roadway, etc., use the wording:
  - ◆ *The design is in accordance with current AASHTO and Interim Specifications.*

## 2. Allowable Stresses:

☐ Cast-in-place Concrete:  $f'_c = 3500$  psi;  $f_s$  (Reinf.) = 24,000 psi.

$$f_c = 1400 \text{ psi; } n = 8.$$

$$\text{Metric: } f'_c = 25 \text{ MPa; } f_s \text{ (Reinf.)} = 160 \text{ MPa.}$$

$$f_c = 10 \text{ MPa; } n = 8.$$

☐ Prestressed Concrete:  $f'_c = 5000$  psi;  $f_s$  (Nonprestressed) = 24,000 psi;  $n = 6$ .

$$\text{Metric: } f'_c = 35 \text{ MPa; } f_s \text{ (Nonprestressed)} = 160 \text{ MPa; } n = 6.$$

*Note:  $f'_c$  may be increased to 6000 psi if necessary. Special approval is required for  $f'_c > 6000$  psi. [Metric: Use 42 MPa for 6000 psi.]*

☐ Structural Steel:  $f_s = 20,000$  psi (For AASHTO M 270 Gr. 36 Steel)



$f_s = 27,000$  psi (For AASHTO M 270 Gr. 50 or 50W Steel)

Metric:  $f_s = 138$  MPa (For AASHTO M 270 Gr. 250 Steel.)

$f_s = 190$  MPa (For AASHTO M 270 Gr. 345 or 345W Steel.)

✓ If other steels are used, list type of steel and appropriate allowable stresses.

3. Wearing Surface:

✓ English: 1/2" Concrete; 35 psf (Future).

✓ Metric: 13 mm. Concrete; 1.70 kPa (Future).

4. List the design speed of each road and ramp associated with the structure crossing in the following manner:

❑ Design Speed: I-80 70 mph; County Road 50 mph; Ramp A-6 35 mph.

5. Title "**DESIGN DATA**"

**Examples:**

**DESIGN DATA**

HS 20-44 or Interstate Alternate Loading in accordance with current AASHTO and Interim Specifications.

Cast-in-place Concrete:  $f_c = 1400$  psi;  $f_s(\text{Reinf.}) = 24,000$  psi;  $n = 8$ .

Prestressed Concrete:  $f'_c = 5000$  psi;  $f_s(\text{Nonprestressed}) = 24,000$  psi;  $n = 6$ .

Structural Steel:  $f_s = 20,000$  psi.

Wearing Surface: 1/2" Concrete; Future = 35 psf.

Design Speed: \_\_\_\_\_ m.p.h.

**DESIGN DATA**

MS 18 (HS 20) or Interstate Alternate Loading in accordance with current AASHTO and Interim Specifications.

Cast-in-place Concrete:  $f_c = 10$  MPa;  $f_s(\text{Reinf.}) = 160$  MPa;  $n = 8$ .

Prestressed Concrete:  $f'_c = 35$  MPa;  $f_s(\text{Nonprestressed}) = 160$  MPa;  $n = 6$ .

Structural Steel:  $f_s = 138$  MPa.

Wearing Surface: 13 mm. Concrete; Future = 1.70 kPa.

Design Speed: \_\_\_\_\_ km/h.

**QUANTITIES**

*Except for Title, Column Headings and providing adequate space, this item may be omitted until the design is complete.*

1. Show Quantities Table Thus:

Item	Estimated	Unit	As Const.
Structural Concrete (Est. Qty. ____ Cu. Yds.)	1	Lump	
Reinforcing Steel (Epoxy Coated)		Lb.	
Granular Backfill Borrow		Cu. Yd.	

2. Bid item titles and their corresponding units should always be identical with the wording used in the Standard Specifications or Special Provisions. Only those items applicable to a given structure should be used. A partial list of the most frequently used bid items and their corresponding units follows:

QUANTITY LIST			
ITEM	ESTIMATED	UNIT	AS CONST.
STRUCTURAL CONCRETE (EST. QTY. _____ CU. YDS.)	ONE	LUMP	
REINFORCING STEEL (EPOXY COATED)	_____	LBS	
STRUCTURAL STEEL (EST. QTY. _____ LBS.)	ONE	LUMP	
PRESTRESSED CONCRETE MEMBERS, (TYPE __, ____'-__")	_____	EACH	
DRILLED CAISSONS (___ IN. DIAM.)	_____	LIN. FT.	
DRIVEN PILES _____ DIAM.	_____	LIN. FT.	
FURNISHING PILE DRIVING EQUIPMENT	ONE	LUMP	
GRANULAR BACKFILL BORROW	_____	CU. YD.	
CONCRETE SLOPE PROTECTION	_____	SQ. YD.	
PILE SLEEVES	_____	LIN. FT.	
ELECTRICAL WORK — BRIDGES	ONE	LUMP	
CHAIN LINK FENCE SIZE _____)	_____	LIN. FT.	
PRESTRESSED CONCRETE	_____	CU. YD.	
POST-TENSIONING	ONE	LUMP	

3. Title Table "QUANTITIES."

## **TITLE BLOCK**

1. Top line = Name of Project
2. 2nd line = Name of Structure
3. 3rd line = Name of sheet: "**SITUATION & LAYOUT**"
4. Show project number; structure drawing number, county location and Sheet No. 1.
5. Fill in initials and signatures.